ENVIRONMENTAL ASSESSMENT

ISRAEL RIVER WEIR

LANCASTER, NEW HAMPSHIRE

Department of the Army
New England Division, Corps of Engineers
Waltham, Massachusetts

December 1977

ENVIRONMENTAL ASSESSMENT

ISRAEL RIVER WEIR, LANCASTER, NEW HAMPSHIRE

PREFACE

The purpose of this project is to control ice-jam flooding from the Israel River to the town of Lancaster, New Hampshire. In the Israel River's present condition, large ice floes form in various portions of the river during the colder months. Later in the year, rising temperatures increase snow and ice melt in the watershed, thus increasing the flow in the river and decreasing the stability of the ice floes. The ice eventually breaks up and floats down stream. Upon reaching constrictions and a decreased channel gradient in the center of Lancaster, ice jams form. This jamming effect, coupled with seasonal high flows, causes water levels to rise and inundate nearby property. At least 24 significant ice-jam floods have been recorded in Lancaster during the 83-year period between 1885-1968.

Approximately 12 acres of commercial, industrial, and residential property valued in excess of $1,200,000 is subject to such flooding. Flood damage surveys reveal that a flood stage reoccurrence of the 1968 ice-jam flood event would create $149,000 in damages to affected property owners. Recurring losses at various sites of ice-jam flooding were combined with stage-frequency data. This analysis indicated that about $46,700 in annual damages are predicted to result from ice-jam flooding in Lancaster, N.H. without some mitigating action.

The situation as described heretofore prompted the Corps of Engineers to study the problem and recommend measures to protect local interests

under the authority of Section 205 of P.L. 824, 87 Congress. The basic solution is to control ice-jamming in the Lancaster area. This is the aim of this proposed project.

PROJECT DESCRIPTION

As a result of engineerirg and environmental studies, the most suitable plan of action was developed as described hereafter. The proposed plan would provide for the construction of a gabion overflow weir across the Israel River, just upstream of the Mechanic Street covered bridge at the former site of the Twin State Gas and Electric Co. dam, approximately 0.5 miles upstream of the Main Street bridge (see figure 1).

Gabions are rock filled galvanized steel-wire baskets. The gabions are approximately 30% porous; thus not totally restrictive to water flow, yet capable of blocking large ice floes.

The design specifications provide for a gabion weir 162 feet long (across the river), 6 feet high, with a 3 foot top width; the downstream face is vertical, while the upstream face is at a 45^{o} angle, creating a 9 foot base width. A four foot wide midstream opening in the weir would allow fish passage when necessary. This weir would be built on a mattress constructed from 9" thick gabions covering a basin area of 45 x 162 feet.

Three gabion cribs would be placed upstream of the weir to act as additional ice holding structures. These cribs would have a top of 9' x 6' in size with the upstream face sloped to a 9' x 15' rectangular base. See figure 2 for an artistic rendition of the proposed facility.

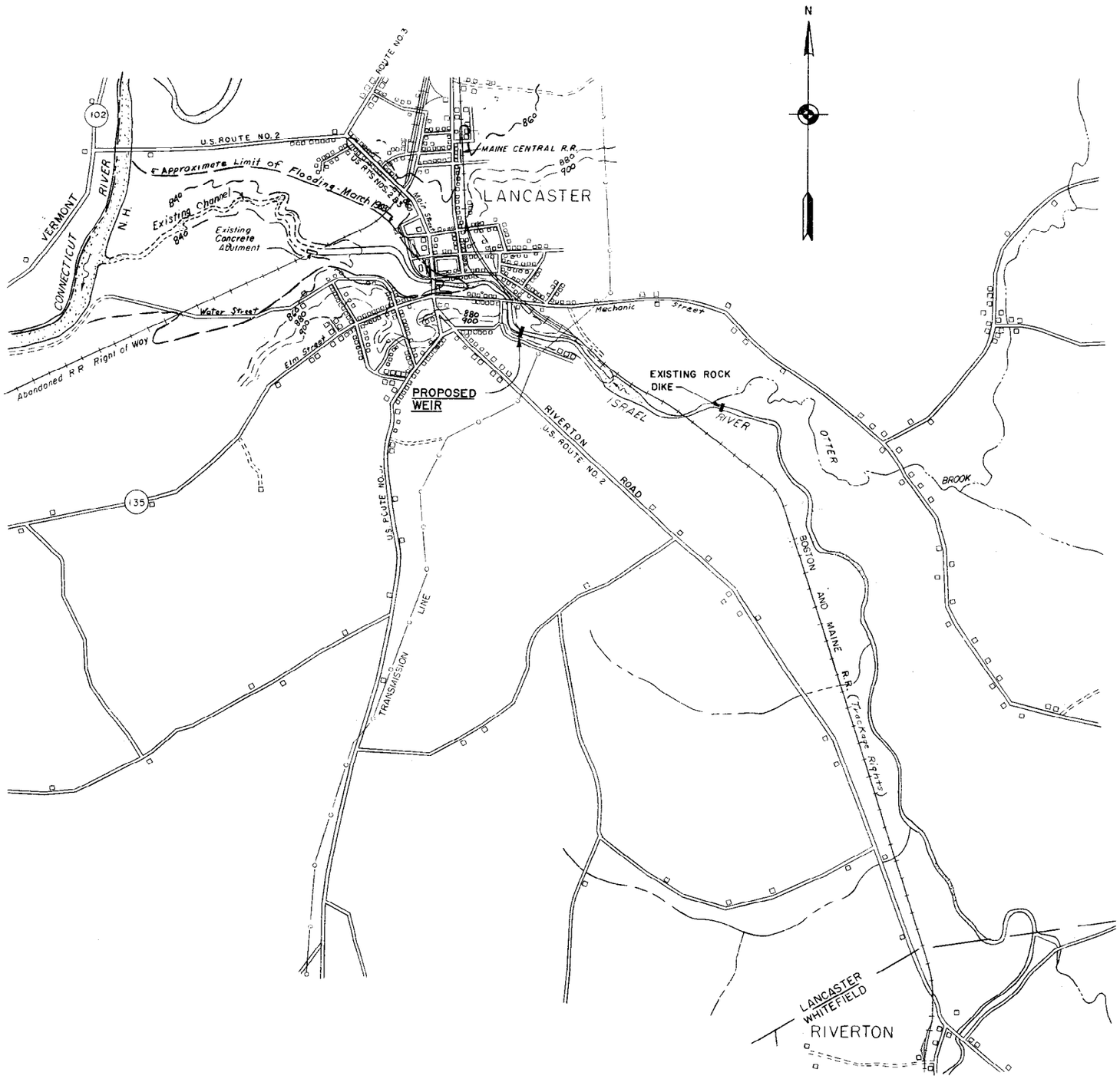
An impervious earth fill dike would be constructed across a low swale near the left (facing upstream) abutment to prevent the river from taking that course when restricted by ice-jamming at the weir. In

addition, the proposed plan calls for restoration of an existing rock dike located near the Otter Brook - Israel River confluence by placement of additional stone.

Federal and non-Federal annual charges (based on a project life expectancy of 50 years and using an amortization rate of 6 5/8% on the first cost estimate of $150,000) were estimated to be about $10,300. In addition, estimated annual operation and maintenance costs (a local responsibility) would be about $700, making the total annual charges $11,000. Annual benefits directly derived from the difference between annual ice-jam related flood losses under current conditions and those expected with the project amount to $46,000. When compared to the total annual charge of $11,000, the resulting benefit to cost ratio is 4.2 - 1.0.

CORPS OF ENGINEERS

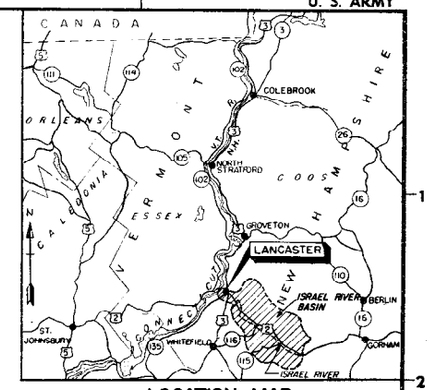
U. S. ARMY



PROJECT PLAN

SCALE: 1"=1000'

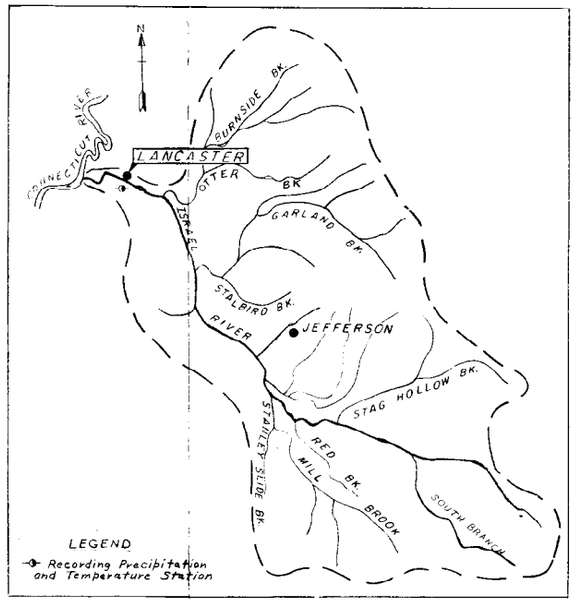
1000' 0 1000' 2000'



LOCATION MAP

SCALE IN MILES

0 5 10



BASIN MAP

SCALE: 1"= 2 MILES

(D.A. 133 SQ. MI.)

2 0 2 4

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY	DR. BY	CK. BY
C.M.H.	D.L.W.	

SUBMITTED:

CHIEF, SECTION

REVIEWED:

PROJECT ENGINEER

APPROVED:

CHIEF, DESIGN BRANCH

WATER RESOURCES DEVELOPMENT PROJECT
LANCASTER, NEW HAMPSHIRE
LOCAL PROTECTION PROJECT
PROJECT PLAN

ISRAEL RIVER NEW HAMPSHIRE

APPROVED DATE

CHIEF, ENGINEERING DIVISION

SCALE AS NOTED SPEC. NO.

DRAWING NUMBER

SHEET

FIGURE 1

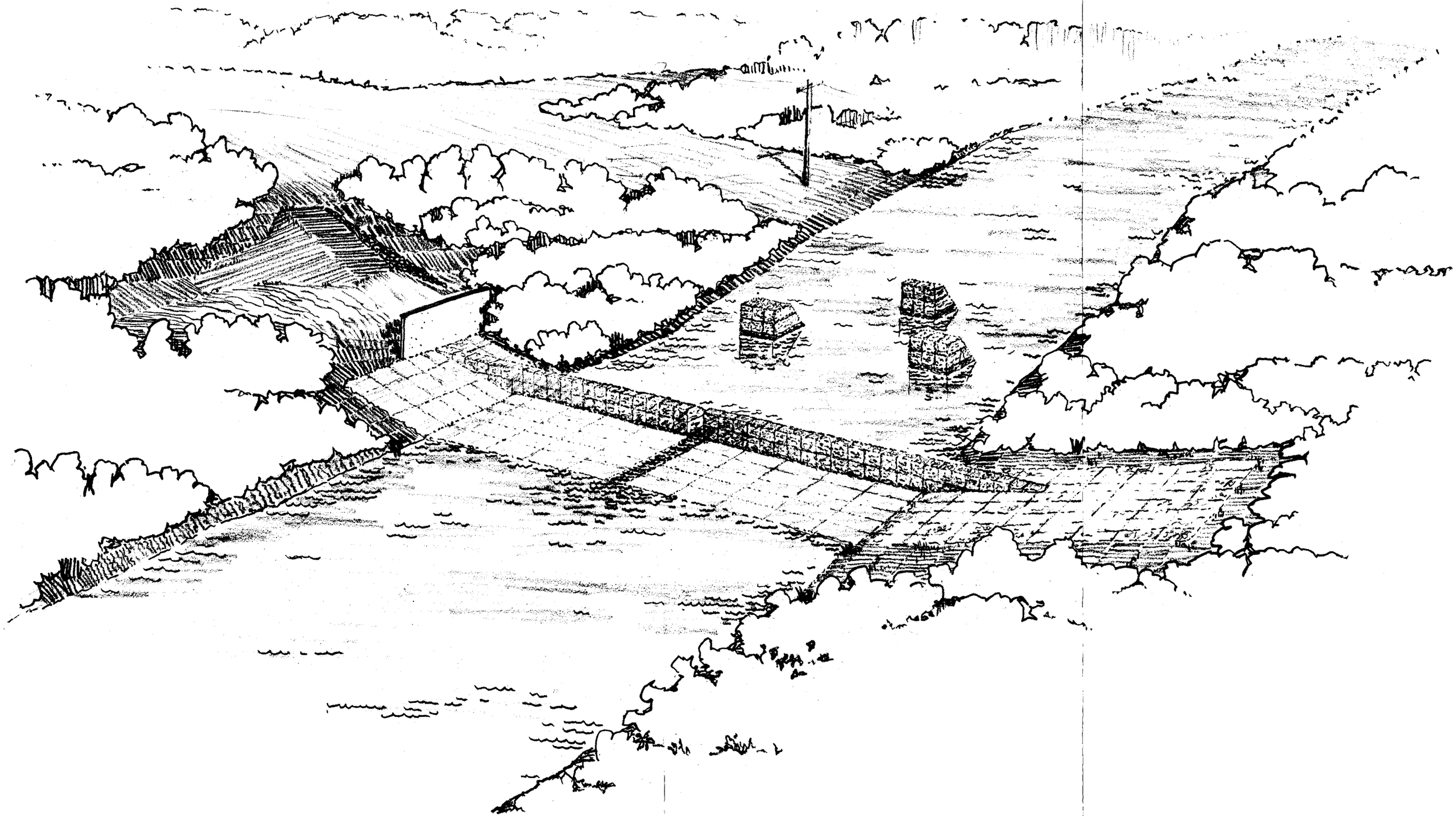


FIGURE 2

ENVIRONMENTAL SETTING

Geography: Lancaster, New Hampshire (1974 population estimate = 2,500), is located on the Israel River about 1.5 miles upstream from its confluence with the Connecticut River. The Israel River is about 21 miles long with a watershed area of 133 square miles, which drains the western slopes of the White Mountains; and part of which (but not Lancaster or the project site) is within White Mountain National Forest. The Israel River and its tributaries are typical mountain streams; as such, they are of high gradient with many rapids and riffle areas and good quality water flowing over a substrate of sand, gravel, and various sized stones. The scenario is generally considered of high aesthetic value, a factor influencing the economy of the area, which is based on tourism and winter sports, as well as some farming (mostly pastoral) and light industry.

Biology: The vegetation and fish and wildlife resources of the area are typical of a New England mountainous terrain. The forests comprise the basic vegetation of the area. Species found include primarily beech, birch, and maple in the well drained areas, with spruce and fir in the less well drained and most mountainous areas.

Field studies of the Israel River in August, 1974 were conducted by Corps biologists to evaluate the aquatic resource of the Israel River in the general vicinity (just upstream) of the proposed gabion weir. The river has an average width of approximately 40 feet; depth, 1-3 feet; and a substrate of sand and gravel. Temperature and dissolved oxygen levels ranged from 68^{o}-77^{o}F and 8.1-8.8 p.p.m. respectively. This portion of the river has little cover, thus insolation is high enough to elevate the

temperature this high. Such temperatures are non-conducive to salmonoid fishes, especially brook trout. However, many tributary streams of the area may offer habitat for populations of brook, brown and rainbow trout; and, according to Fish and Wildlife Service, portions of the Israel River may also offer excellent salmon habitat. Existing salmon restoration programs in the Connecticut River may allow salmon to eventually utilize this area. Consideration for such fishery potential is the basis for design of the proposed weir with a midstream fish passage.

Wildlife species of the area include white-tailed deer, black bear, snowshoe hare, red squirrel, lynx, fisher, bobcat, red fox, otter, porcupine, raccoon, beaver, mink. Typical avian residents include crow, raven, ruffed grouse, woodcock, black-capped chickadee, blue-jay, slate-backed junco (snow bird), and various black birds, nuthatches and woodpeckers. Principal waterfowl species found in the area are black duck, ring-necked duck, wood duck, mallards, teal, and Canada geese.

The fish and wildlife resources offer excellent opportunity for hunting, fishing, and trapping. Such amenities further enhance recreational opportunities of the area.

Immediate Project Proximity: The proposed project site is at the remains of an old dam. Here the Israel River is approximately 80 feet wide with a sand and gravel bottom. The banks are relatively steep with scant vegetation consisting primarily of small upland bushes and trees; there is little overhanging growth.

ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

The proposed project will have a negligible effect on the environment of the area. Short term impacts include disruption of streamside vegetation and stream benthos, some sedimentation, and increased human activity in the project vicinity during construction.

Once completed, the gabion weir and associated structures should have no discernable detrimental effects on local wildlife or fisheries. According to Dept. of Interior, Fish and Wildlife Service, fishes should be able to negotiate the gabions during moderate to high flows; and, during low summer flows, the four-foot wide opening will ensure fish passage. The inherent structure of the gabions will allow interstitial colonization by various stream invertebrates and algae. This will perhaps increase stream productivity and diversity at the site.

The function of the weir, to hold ice, will cause flooding at this location. But, with the small dike in the one low area, the higher waters should not cause widespread flooding in this portion of the river because of relatively steep and high banks. During ice-jam flooding conditions, as much as ½ acre of stream-side terrain just upstream from the weir will be subject to inundation by ice and water. Subsequent scouring will disrupt the riparian vegetation of this area, creating some stress to the affected environment; however, this impact should be of little significance.

The state historical preservation officer has been informed of the proposed project. No impacts to cultural resources are anticipated; verification of this is in process. The only other foreseeable impact will be visual (presence of the weir and associated structures). The gabions, however, are much more visually compatible with the environment than would

be other construction materials, such as concrete. Therefore, the visual impact should not be significantly adverse (please refer back to figure 2).

Communiciation has been conducted with the U.S. Fish and Wildlife Service, and they foresee no significant impacts with this proposed plan (see attached letter).

ALTERNATIVES TO THE PROPOSED ACTION

The ice-jam flooding situation has been studied for many years; during this time, many alternatives have been considered. Feasible alternatives viewed were:

a. Construction of a multipurpose dam, and reservoir for ice control, flood control, and recreation.

b. Channelization of the Israel River.

c. Replacement of the present Main Street Bridge (and perhaps others) with a larger span.

d. Construction of a dry-bed dam or weir to temporarily hold back excessive ice and water.

e. No action.

Alternative (d) is considered the best plan. It proposes to provide minimal environmental impact and should alleviate the ice-jam flooding problems. Alternatives (a, b, and c) would cost more and create more environmental impacts; and, alternative (e) no action, would allow the present ice-jam flooding to persist.

Three types of dry-bed dams (weirs) were viewed: concrete, gabion, and timber. The timber dam would have the lowest initial cost, but the life span of the dam would be only 10-20 years and local maintenance costs would be high. A concrete dam would require minimal maintenance, but initial costs would be 1.5-2 times higher than for timber or gabions. A gabion weir would have an initial cost slightly higher than timber, but significantly lower than concrete; it should require much less maintenance than timber and last 50 years or more. Gabions will also be more visually and biologically compatible with the surrounding environment than concrete. Thus, both environmental and economic considerations indorse a gabion weir as the most agreeable alternative.

IRRETRIEVABLE OR IRREVOCABLE COMMITMENT OF RESOURCES

The project would involve a commitment of materials and personnel required to design, construct, and maintain the involved structures. No other significant commitments will be necessary.

CONCLUSION

Upon evaluating the information presented in this Environmental Assessment, it is my belief that construction of the overflow, gabion weir with associated cribs and diking for protection from ice-jam flooding to the town of Lancaster, New Hampshire is in the best public interest. This environmental impact assessment has, in my evaluation, been properly prepared in accordance with the National Environmental Policy Act of 1969. It shows that environmental impacts associated with the project are minor and therefore precludes the need for an environmental impact statement.

28 February 1978
(date)

JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Post Office and Courthouse Building
BOSTON MASSACHUSETTS 02109

JAN 21 1976

Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

We are enclosing herewith a report of the U. S. Fish and Wildlife Service on a plan to reduce ice-jam flooding of the Israel River at Lancaster, New Hampshire.

Of the several plans studied, we find the current one--utilization of a gabion structure--to have minimal environmental impacts. We encourage its selection if a project is implemented on the Israel River.

Sincerely yours,

Howard D. Woon

ACTING Regional Director

Enclosure

ISRAEL RIVER AT LANCASTER, NEW HAMPSHIRE, LOCAL PROTECTION PROJECT

Report of the U. S. Fish and Wildlife Service on a Plan
Being Developed by the U. S. Army, Corps of Engineers,
New England Division, to Reduce Ice-jam Flooding.

January 21, 1976

I. Preface

The Israel River Local Protection Project Study was authorized under Section 205 of P. L. 874, 87th Congress. This report has been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), in cooperation with the New Hampshire Fish and Game Department. Our report of September 14, 1967, commented on a channelization plan, and our report of January 23, 1974, commented on the dam project. We understand that both of these plans have been superseded by one which proposes the utilization of a gabion structure.

II. Project Description

As currently proposed, the plan consists of an overflow weir, constructed of gabions, to be placed across the Israel River, approximately 0.2 miles upstream from the Mechanic Street Bridge in Lancaster. The structure would consist of a 45.5-foot-wide, 166-foot-long, one-foot-thick gabion "mattress" base extending across the Israel River and onto the banks. A nine-foot-wide, six-foot-high, 133-foot-long weir would be constructed on top of the mattress base. The plans include a four-foot-wide "channel" opening through the center of the structure. In addition, three gabion ice-holding cribs, 9' X 15', would be placed in the river approximately 200 feet upstream from the weir structure.

III. Environmental Setting Without-the-Project

Lancaster, New Hampshire, is located on the Israel River at the intersection of U. S. Highway Routes 2 and 3, about 1.5 miles upstream of the confluence of the Israel and Connecticut Rivers. In 1974, the population was approximately 2,500. The Israel River is about 21 miles long, with a watershed of 133 square miles (85,120 acres). The watershed is partly within the White Mountain National Forest and drains the western slopes of the White Mountains. It is generally steep, with the exception of the moderately sloping flood plain area from the Connecticut River upstream to Main Street in Lancaster. Forest vegetation in the watershed is in the transition zone between beech-birch-maple and spruce-fir.

The river downstream from Lancaster is in the Connecticut River flood plain. Flooding has resulted from ice-jams in Lancaster when Israel River ice is backed up by Connecticut River ice. A number of measures have been explored

to reduce flooding in the past, including the installation of a submarine net and a rock dike upstream from Lancaster.

The immediate project area is at the site of an old dam, 2,300 feet upstream from the Route 3 bridge in Lancaster. Remains of the old dam, including a concrete abutment, are visible. Here, the Israel River is approximately 80 feet wide with a sand and gravel bottom, riffle areas, and small pools. This section of the river contains scant vegetation. Ground cover along the banks consists of small, upland bushes and trees; there is little overhanging growth.

Aquatic Resources

The Israel River contains resident populations of brook, brown, and rainbow trout, and is stocked by the New Hampshire Fish and Game Department. In addition to trout habitat, portions of the river contain potential rearing and spawning habitat for Atlantic salmon, especially upstream from Lancaster. An Atlantic Salmon Restoration Program is underway in the Connecticut River Basin. Resident or anadromous fish coming from the Connecticut River would have to pass through the project area in order to reach spawning areas.

Terrestrial Resources

The Israel River watershed contains many wildlife species which provide various forms of recreation. Upland game species include white-tailed deer, black bear, snowshoe hare, ruffed grouse, and woodcock. Fur bearers in the area include the fisher, bobcat, red fox, otter, raccoon, beaver, mink, and weasel. Black duck and wood duck are the principal waterfowl species. The watershed provides significant seasonal hunting and trapping activity. No known endangered species occur in the area.

IV. Environmental Impact With-the-Project

The proposed project is expected to have a negligible impact on wildlife of the area, although the actual construction and movement of the necessary equipment will cause some disturbance to both the benthic organisms and the vegetation along the stream bank. The disturbance, however, is expected to be minimal, and we anticipate the benthos to repopulate the area within several months. One favorable aspect of using rock gabions is that they will be more visually compatible with the environment than would other construction materials, such as cement. The source of rocks for the gabion is an important consideration. Leaving sections of the river devoid of rocks can depreciate fish habitat.

V. Discussion

In our previous reports, our primary concern has been the impact on fish resources. The proposed gabion structure would have little or no impact on fish and wildlife resources. Fishes should be able to negotiate the

gabions during moderate to high flows. In addition, the four-foot-wide opening would ensure fish passage during low summer flows.

In conclusion, we do not believe that any significant impacts, beneficial or adverse, will result from project construction. We, therefore, have no objection to project construction, and we commend the Corps of Engineers for developing a plan that will have minimal environmental impacts.

15